

MULTIMEDIA



UNIVERSITY

STUDENT ID NO

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# MULTIMEDIA UNIVERSITY

## FINAL EXAMINATION

TRIMESTER 2, 2018/2019

### ECP2046 – COMPUTER ORGANIZATION AND ARCHITECTURE (TE, RE)

11 MARCH 2019  
9.00 a.m – 11.00 a.m  
(2 Hours)

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#### INSTRUCTIONS TO STUDENTS

1. This question paper consists of 2 pages excluding cover page with 4 questions only.
2. Attempt ALL 4 questions. All questions carry equal marks and the distribution of the marks for each question is given.
3. Please write all your answers in the answer booklet provided

**QUESTION 1**

- a) List and describe any five key services provided by an operation system. [10 marks]
- b) Below are the five memory management techniques. Describe each technique and state their strengths and weaknesses
- i) Fixed partitioning
  - ii) Dynamic partitioning
  - iii) Simple paging
  - iv) Simple segmentation
  - v) Virtual memory paging
- [15 marks]

**QUESTION 2**

- a) Convert the following numbers in decimal representation to two's complement representation with length of 8 bits
- i)  $7_{10}$
  - ii)  $-4_{10}$
  - iii)  $-128_{10}$
- [6 marks]
- b) Calculate the following floating-point arithmetic in binary form and store in IEEE 32-bit floating-point format:
- $$36.25_{10} + 0.6875_{10}$$
- [5 marks]
- c) Calculate  $-3_{10} \times 7_{10}$  using Booth algorithm
- [14 marks]

**Continued ...**

**QUESTION 3**

- a) State all the types of addressing modes and draw a diagram for each to illustrate them. [19 marks]
- b) Compare *horizontal micro-instruction* and *vertical micro-instruction* in terms of microprogramming. [6 marks]

**QUESTION 4**

- a) By using a timing diagram, evaluate the improvement the superpipelining and superscalar machines attain compared to a pipelining machine, when executing a six four-stage instructions. Assume a degree of 2 for both the superpipelining and superscalar machines. [11 marks]
- b) List and briefly explain the five limitations to superscalar architecture. [10 marks]
- c) Refer to the instruction below:

Instruction 1 :  $R1 = R1 + R6$ ;

Instruction 2 :  $R4 = R1 + 2$ ;

Instruction 3 :  $R2 = R9 + 5$ ;

Instruction 4 :  $R9 = R2 + 1$ ;

Instruction 5 :  $R2 = R8 + 3$ ;

Identify the type of dependency between the following instructions. Justify your answer.

- i) Instruction 1 and 2 [2 marks]
- ii) Instruction 3 and 5 [2 marks]

**End of Paper**